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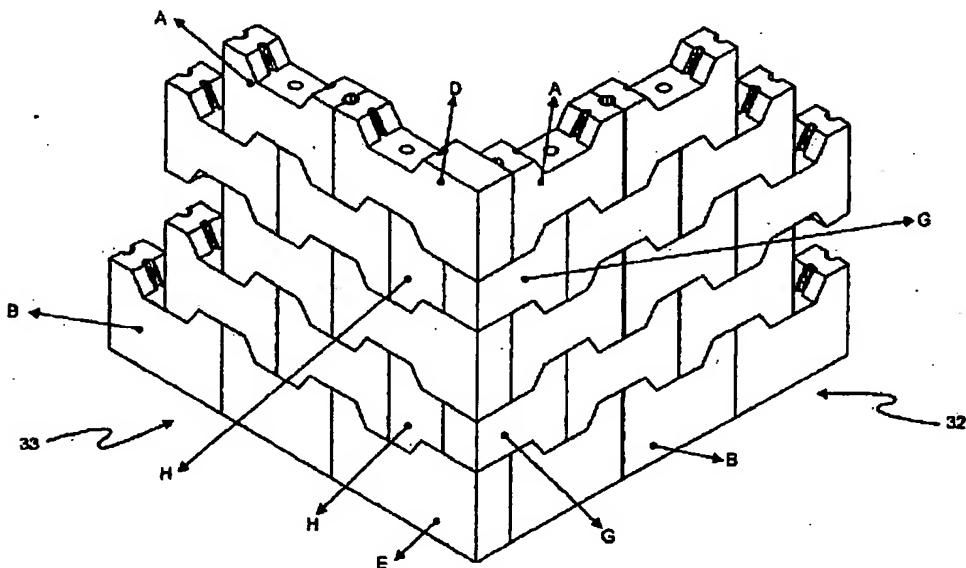
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## (54) A set of modular blocks for the construction of internal and external walls of buildings

(57) A set of modular blocks for the construction of buildings in general, specially designed to meet different situations arising during work execution. It comprises a standard block and various supplementary blocks which show, on their external side faces, straight longitudinal grooves arranged centrally, extending from one end to the other, and matching with a pass-through duct defined in an equidistant central section; supplementary

blocks meet the same constructive criteria and are characterized by the combination of side extensions - equivalent to the thickness of each block - with middle section cuts to define split blocks, with flat supporting bases (which eliminate two of the legs), and with the side extension of the shorter section, the set being completed by the inclusion of supplementary blocks to serve as closing covers and anchorage caps.

FIG. 21



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**Description**

[0001] This patent is mainly aimed to protect the invention of a **SET OF MODULAR BLOCKS FOR THE CONSTRUCTION OF INTERNAL AND EXTERNAL WALLS OF BUILDINGS**, which show particular shape and design features specially conceived to efficiently solve the problems usually encountered during the building of walls.

[0002] More specifically, this patent protects a set or kit of blocks for the swift and straightforward construction of partitions and walls as a whole. Basic modules are combined with other special blocks which, based on the same constructive criteria, show very particular individual features to enable corner junctions, "T" junctions, crosses, lintels, sills, and/or lower and higher top rows, so that all the situations arising in the overall construction of buildings may be adequately met.

[0003] Therefore, the subject-matter of this patent is a set of modular blocks which, at the same time as they meet the same constructive and functional conception, also show applied differences to provide for mutual fitting and stable locking as necessary throughout the building.

**PRIOR DESIGN**

[0004] The basic block which makes up the modular set referred to under this patent registration shows a general H-shaped configuration with two main flat faces, a front and a rear one, oblique internal and external side faces, and flat top and bottom faces, including matched joints on its side faces. These joints are characterized by straight protruding ribs and straight grooves, centrally arranged and extending from one end to the other of each face.

[0005] The block is characterized by the fact that external side faces show straight longitudinal grooves, centrally arranged and extending from one end to the other, whereas upper internal side faces include longitudinal ribs centrally arranged and extending from one end to the other, and lower internal side faces contain straight longitudinal grooves, also extending from one end to the other.

[0006] It should be stressed that the above-mentioned ribs and grooves are supplementary configured so that they fit in with each other and thus engage firmly to withstand transversal stresses.

[0007] This kind of block has performed satisfactorily in comparison with other H-shaped blocks due to the aforementioned side grooves which, faced against each other, form ducts to contain the mixtures that will allow the sealing of junctions. These will in turn serve as expansion joints.

[0008] However, this basic block as defined above cannot be used at junctions, top rows and opening edges. This forces the builder to engage in additional brick-work and finishing jobs which not only increase the total

cost of each work but also cause its delay as they require adjustments and modifications tailored to each case which not everyone in the craft can perform efficiently.

[0009] The main advantage of concrete-based blocks over conventional clay bricks is the fact that they allow a fast work execution, combined with an easy assembly and economical binding mixtures.

**NOVELTY - MAIN SUBJECT-MATTER**

[0010] This patent covers a set of blocks specially designed to act as components supplementary to the H-shaped blocks defined above. They belong to the same modular set because they follow the same constructive principle, but each kind of block shows its own features as necessary to meet the specific requirements which may arise during the execution of the work.

[0011] Therefore, based on the set invented, the only thing that remains for the architect or builder to do once the building to be erected has been defined is to prepare the pertinent drawings so that the exact kit or set of blocks for work execution can be defined in full detail.

[0012] Then, there will be a specific quantity of standard or basic blocks combined with other quantities of blocks specified for corners, openings, etc.

[0013] Consequently, the main subject-matter of this patent can be defined as **A SET OF MODULAR BLOCKS FOR THE CONSTRUCTION OF INTERNAL AND EXTERNAL WALLS OF BUILDINGS**, H-shaped,

showing two main flat faces (a front and a rear one), oblique internal and external side faces, and flat top and bottom faces, and including - for oblique internal side faces - a matched assembly between straight protruding ribs and straight grooves centrally arranged and extending from one end to the other of each face. The set comprises a standard block and a number of supplementary blocks with their external side faces showing straight longitudinal grooves centrally arranged and extending from one end to the other which match with a pass-

through duct located right in the middle. In line with the constructive criteria described above, supplementary blocks are characterized by the combination of side extensions reaching as far as the thickness of each block with middle section cuts aimed to define split blocks, with flat supporting bases (which eliminate two-legged ones), and with the side extension of the lower section. The set is completed by supplementary blocks for closing covers and anchorage caps.

[0014] The invention can include supplementary blocks provided with an additional lower leg as thick as the body of the block and extending from the bottom face to the inner surface of the same block.

[0015] Some supplementary blocks define longitudinal planes across middle sections.

[0016] Other supplementary blocks define transversal planes across middle sections.

[0017] At least one of the side faces of the supplementary blocks is completely flat.

[0018] Closing covers match with the cavity formed by two oblique faces.

[0019] Anchorage caps are equivalent to one third of the standard block and constitute a side section made up of two oblique faces converging towards a central section.

#### BRIEF DESCRIPTION OF DRAWINGS

[0020] In order to further clarify the advantages roughly described above (which can be greatly increased by users and people in the trade) and to better explain the constructive, constitutive, and functional properties of the set of blocks created, below is an ideal example of performance accompanied by pictures on a schematic basis and without a specified scale. It is worth mentioning that, as it is only an example, it cannot be deemed to restrict or exclude the scope of features protected by this patent, but is only intended as an explanation or illustration of the underlying concept.

[0021] The first five pictures show each type of block with its specific features to meet the basic requirements of the whole modular set as provided for herein.

[0022] Figure 1 shows a view of a block which will be referred to as standard block from now on, since it constitutes the basic component of the set invented.

[0023] Figure 2 shows a view of the initial standard block, which is needed in particular at the bottom row of each wall to be built.

[0024] Figure 3 shows a view of another block which can also be called initial standard block because it is required for the bottom row of the wall.

[0025] Figure 4 shows a view of another block shorter than the standard block and including a constructive modification to enable its use at corner junctions.

[0026] Figure 5 shows a view of another block which will be referred to as standard finish from now on because it is specially designed for the top row of walls.

[0027] Figure 6 shows a view of another block which will be referred to as double junction leg from now on because it is designed for wall junctions.

[0028] Figure 7 shows a view of another block which will be referred to as initial double junction leg from now on because it is used for bottom or initial row junctions.

[0029] Figure 8 shows a view of another block which will be referred to as finishing double junction leg because it is required to complete top wall row junctions.

[0030] Figure 9 shows a view of another block specially designed to lock different junctions, which will be referred to as  $\frac{3}{4}$  lock from now on.

[0031] Figure 10 shows a view of another block specially designed for other junction locking options, which will be referred to as  $\frac{1}{2}$  lock from now on.

[0032] Figure 11 shows a view of another block intended to be used for door and window openings.

[0033] Figure 12 shows a view of a block which forms part of the set invented and is specially designed to serve as a supplementary closing cover.

[0034] Figure 13 shows a view of a block specially created to be used at door and window openings.

[0035] Figure 14 shows a view of another block which can be used for junctions at different heights.

5 [0036] Figure 15 shows a top view of an application of the set of blocks invented, in this case showing a constructive option for a fourfold junction between walls, at a height corresponding to the initial row.

[0037] Figure 16 shows a side view of the initial row identified as V-V in the previous figure.

[0038] Figure 17 shows a side view of another row that lies on the row illustrated in the previous figure.

[0039] Figure 18 shows a top view of the way how the set of blocks invented solves a fourfold wall junction, at a middle height.

[0040] Figure 19 shows a front view of a lintel and opening jamb using the set of blocks invented.

[0041] Figure 20 also shows a front view of a sill using the set of blocks invented.

20 [0042] Figure 21 shows a view of the corner junction between walls, built using the set of blocks invented.

[0043] The reference numbers and letters appearing in all the figures refer to the components of the set identified as such within the example chosen to explain this invention.

#### DETAILED DESCRIPTION OF AN IDEAL EXAMPLE

[0044] As can be observed particularly in figure 1, the modular blocks which make up the set invented start from a basic block -A- which will be referred to as standard block from now on and which belongs to the group of blocks with a general configuration, that is, with the shape of an H, a couple of external side faces -1- and -2-, and smaller internal side faces -3-, -4-, -5- and -6-, characterized by their obliquity to allow mutual fitting.

[0045] This general configuration is completed by main flat side faces, -7- and -8-, and by top and bottom faces, -9-, -10-, -11-, -12-, -13- and -14-.

40 [0046] Figure 1 also shows how these "standard" -A- blocks include female grooves -15- and -16-, defined on faces -3- y -4-, matching with male ribs -17- and -18-, defined on faces -5- and -6-, thus establishing the matched assembly between equal blocks which link with each other to make up the wall.

[0047] Besides, these blocks also show vertical grooves -19- and -20-, defined on side faces -7- and -8-.

[0048] Walls in general require basic design blocks as described above, where male ribs -17- and -18- on side faces -5- and -6- belonging to an upper block match with the female grooves -15- of two lower adjacent blocks underneath it. Meanwhile, grooves -19- and -20- lying opposite each other and belonging to adjacent blocks gradually form vertical ducts which are filled with a concrete mixture that will serve both as a seal and as an expansion joint.

[0049] This kind of junction, which can be called bidirectional, is very efficient because it allows wall con-

struction to be very fast and at the same time economical due to the use of binding mixture. However, it has not been possible to put it into practice on an industrial and commercial scale because it poses serious difficulties in junction and finish sections and in door and window openings. The builder is expected to make up solutions of his own to define said junctions, but he is not always able to do so. This also consumes time and demands extraordinary expenses.

[0050] The main novelty covered by this patent lies in the creation of a variety of supplementary blocks which, following the same assembly criteria defined above, solve all the situations usually arising during the erection of any kind of building.

[0051] Another novelty is that both the block mentioned above -A- and the remaining supplementary blocks include a pass-through hole -21- which, combined with said vertical grooves -19- and -20-, allows in certain sections the formation of continuous vertical ducts extending from the top to the bottom row. They can be used to lay utility piping as well as tightening components anchored to top and bottom linking beams, thus obtaining earthquake-proof monolithic buildings.

[0052] Figures 2 to 14 show the different modifications introduced in supplementary blocks and not included in the basic design described above.

[0053] Figure 2 shows the initial standard block -B- required for the initial or bottom row. It differs from the standard block in that it shows a completely closed lower part defining a single supporting face for the bottom linking beam. Obviously, this block can also be required for the top row, in which case it is installed in an inverted position in relation to the one appearing in the picture, and it can also be used for openings, sills or lintels.

[0054] The block appearing in figure 3 shows a modification consisting of a central supporting leg -22- which starts from the bottom face -13-, keeps as thick as the block, and extends until it is flush with the rest of the block. This is an additional support which allows the junction between perpendicular walls.

[0055] The block appearing in figure 4 is just half of the block in figure 3. This block is particularly useful for corner junctions.

[0056] Figure 5 shows supplementary block -C-, known as standard finish as it is specially designed to be used for the top row. It differs from block -B- in that it is shorter and thus provides another solution to define the total height of the wall.

[0057] Figure 6 shows supplementary block -D-, known as double leg as it is characterized by a side extension in comparison with the standard block which is equivalent to block thickness. It serves as a junction between walls and its side face -8-, without grooving, is the visible face.

[0058] Block -E- shows the same constructive modification appearing in figure 7 and has been specially designed for bottom rows and opening corners. This block combines the modifications introduced in blocks -B- and

-D- as described above.

[0059] Figure 8 shows block -F-, which can be called double finishing leg as it has been specially designed for top-row wall junctions. It can also be useful to provide similar junctions at openings. Its height is shorter than that of the above-mentioned block -A- but its side is longer, equivalent to block thickness.

[0060] The supplementary block illustrated by figure 9, identified as -G-, has been specially designed to provide junction solutions. It can be called  $\frac{3}{4}$  lock because of the role it plays. It can be described as half a block -A-, laterally extended as far as the measure of thickness.

[0061] The supplementary block illustrated by figure 10, identified as -H-, has also been designed to provide junction solutions, every two rows, and can be called  $\frac{1}{2}$  lock because it is half a standard block -A- without a duct -21-.

[0062] The supplementary block shown by figure 11 has been specially designed to be used at lintels and sills. It is as high as half a block -A- and its face -23- is completely closed. It can be used for top rows, lintels and sills, in which case it may or may not include ribs or grooves on its oblique faces.

[0063] Cover -J- which appears in figure 12 serves to complete finishing jobs. Therefore, apart from including holes -21-, it can also show oblique faces completely flat, with ribs, or with grooves.

[0064] Cap -K- which appears in figure 13 is also useful for finishing. Its oblique faces include grooves -15- and ribs -17-, whereas the opposite flat face -7- does not include a vertical groove in this case; this is equivalent to one third of block -A-.

[0065] Finally, figure 14 shows block -L-, which is the same as block -A- and has its middle section extended as far as the thickness of the block.

[0066] Figure 15 shows a wall junction where the row identified as -24- uses, at the junction point, a supplementary block -E-, double starting leg (Fig. 7), so that the junctions do not interfere with wall erection as they appear. Locks are arranged every two rows. In this case, initial row -25- can use initial standard -A- blocks.

[0067] Figure 16 shows a side view of the aforementioned row -24-, which includes the supplementary block -E- specified above. This figure should be observed jointly with figure 17 since it shows row -26- immediately above initial block -24-, using a block -L- to produce a locking effect at that junction point.

[0068] By way of example, figure 18 shows another wall junction where block -L- is included to allow the insertion of blocks -A- of row -27- and the assembly of identical blocks -A- of row -28-.

[0069] Figure 19 shows blocks -A- combined with blocks -I- and -H- to define lintels -29- and opening jambs -30-. In this case, blocks -I- include grooves -15/16- on their oblique inserting faces.

[0070] The same combination can be applied to figure 20, which shows the same opening, in this case with

jamb -30- and sill -31-. Here, blocks -I- include ribs -17/18- on their oblique inserting faces.

[0071] Finally, figure 21 shows a combination of several supplementary blocks for corner junctions, so that completely flat faces (internal and external) with coplanar sections can be defined as visible faces, at the same time ensuring the lock required. This shows how blocks -G- contribute to locking by being arranged in alternate rows and also how blocks -D-, arranged in alternate rows, combine with blocks -H-, also arranged in alternate rows. Likewise, blocks -E- are combined with blocks -B- for initial rows -32- and -33-.

terized by supplementary blocks with at least one totally flat side face.

6. A SET OF BLOCKS, as claimed under 1, characterized by closing covers with a shape equivalent to that of the cavity created between two oblique faces.
7. A SET OF BLOCKS, as claimed under 1, characterized by anchorage caps which are equal to one third of the standard block and define a side section formed by two oblique faces converging towards a central section.

Claims

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1. A SET OF MODULAR BLOCKS FOR THE CONSTRUCTION OF INTERNAL AND EXTERNAL WALLS OF BUILDINGS, showing a general H configuration with two main flat faces, a front and a rear one, and external side faces, oblique internal and external side faces, and flat top and bottom faces; including the possibility of matched assembly between straight protruding ribs and straight grooves, arranged centrally and from one end to the other of each one of its oblique internal faces; characterized by a set including a standard block and various supplementary blocks which show, on their external side faces, straight longitudinal grooves arranged centrally, extending from one end to the other, and matching with a pass-through duct defined in an equidistant central section; supplementary blocks meet the same constructive criteria and are characterized by the combination of side extensions - equivalent to the thickness of each block - with middle section cuts to define split blocks, with flat supporting bases (which eliminate two of the legs), and with the side extension of the shorter section, the set being completed by the inclusion of supplementary blocks to serve as closing covers and anchorage caps.

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2. A SET OF BLOCKS, as claimed under 1 above, characterized by supplementary blocks also including a bottom supporting leg as thick as the body of the block, which extends from the bottom face until it is flush with the internal face of the same block.

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3. A SET OF BLOCKS, as claimed under 1, characterized by middle section cuts on longitudinal planes.

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4. A SET OF BLOCKS, as claimed under 1, characterized by middle section cuts on transversal planes.

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5. A SET OF BLOCKS, as claimed under 1, charac-

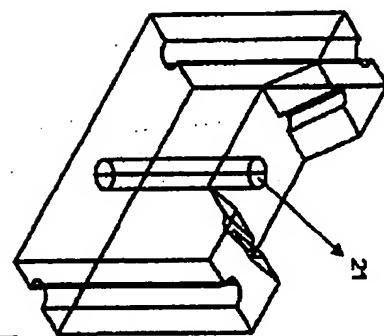


FIG. 2

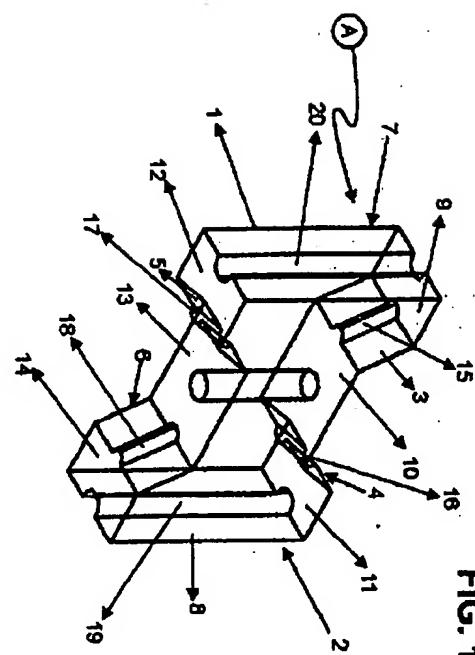


FIG. 1

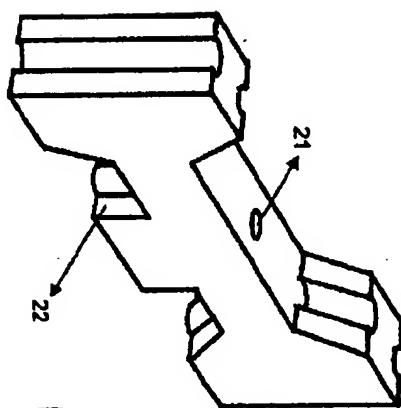


FIG. 3

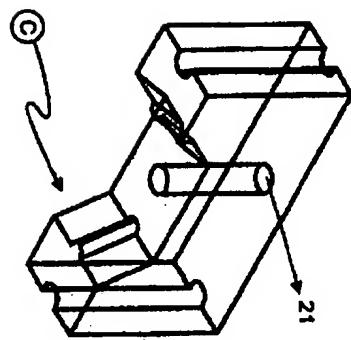
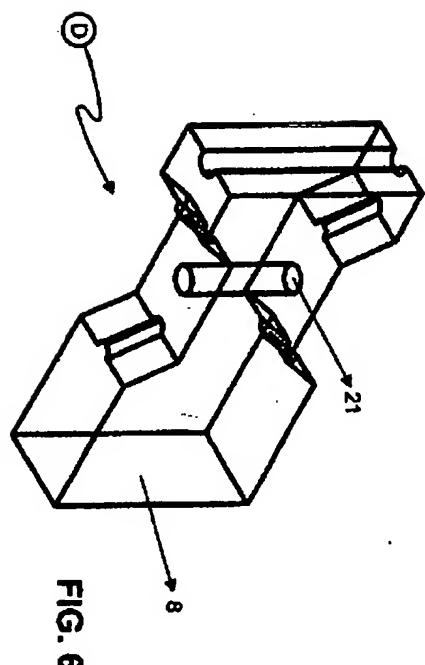
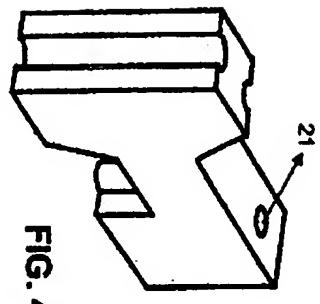


FIG. 8

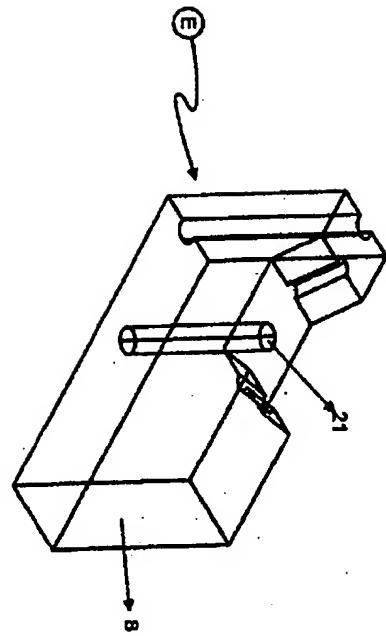
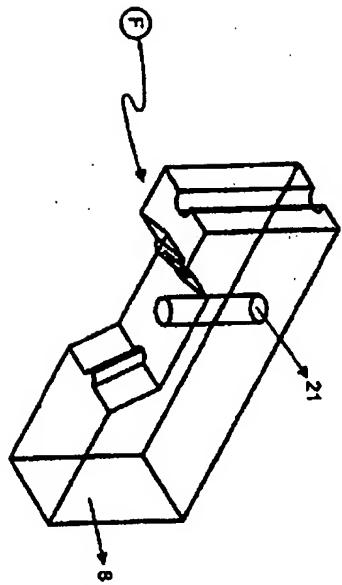


FIG. 7

FIG. 9

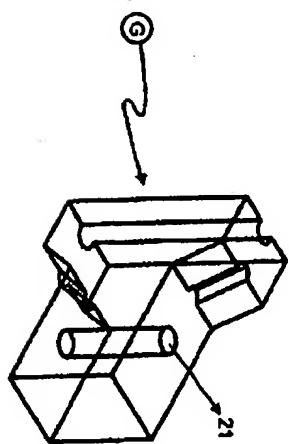


FIG. 10

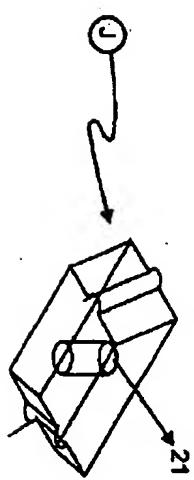
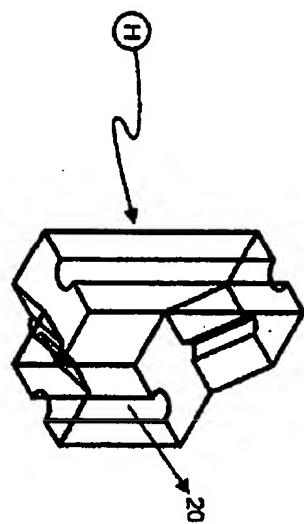


FIG. 12

FIG. 11

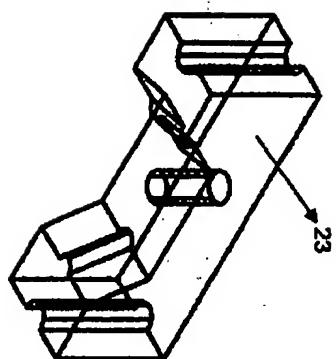


FIG. 11

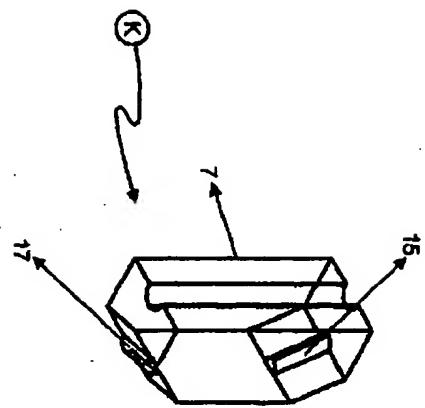


FIG. 13

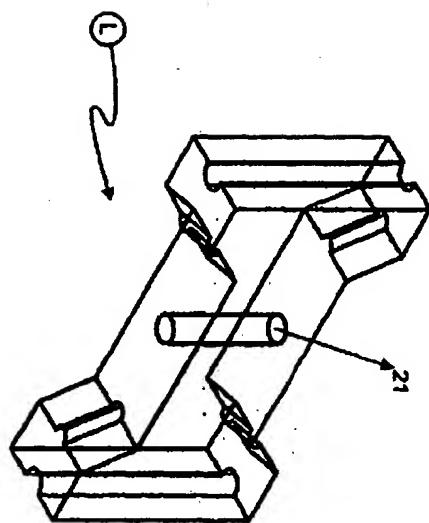


FIG. 14

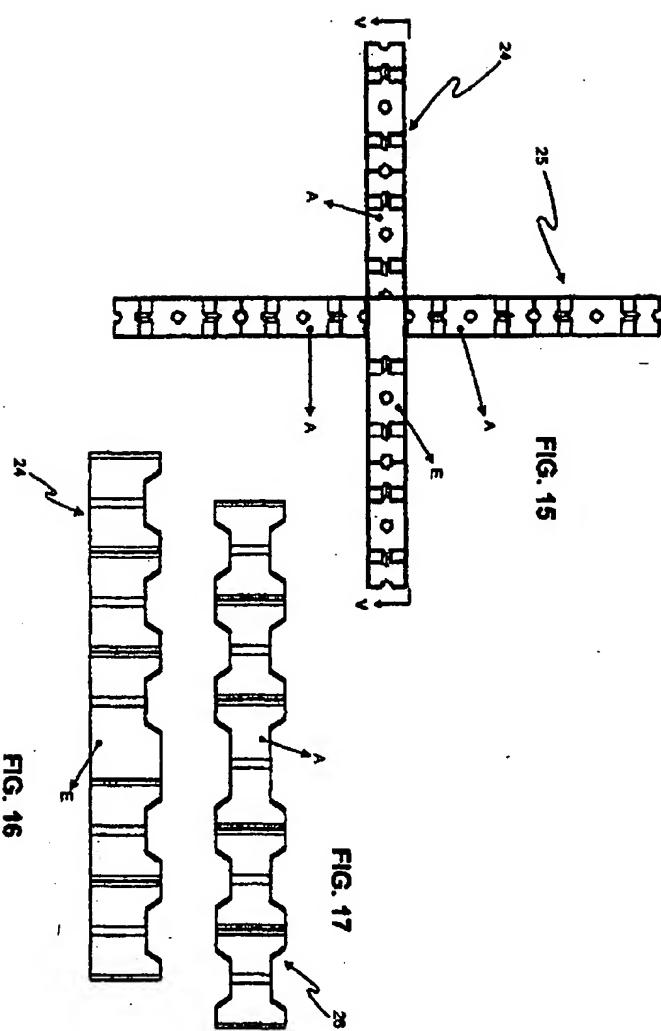


FIG. 18

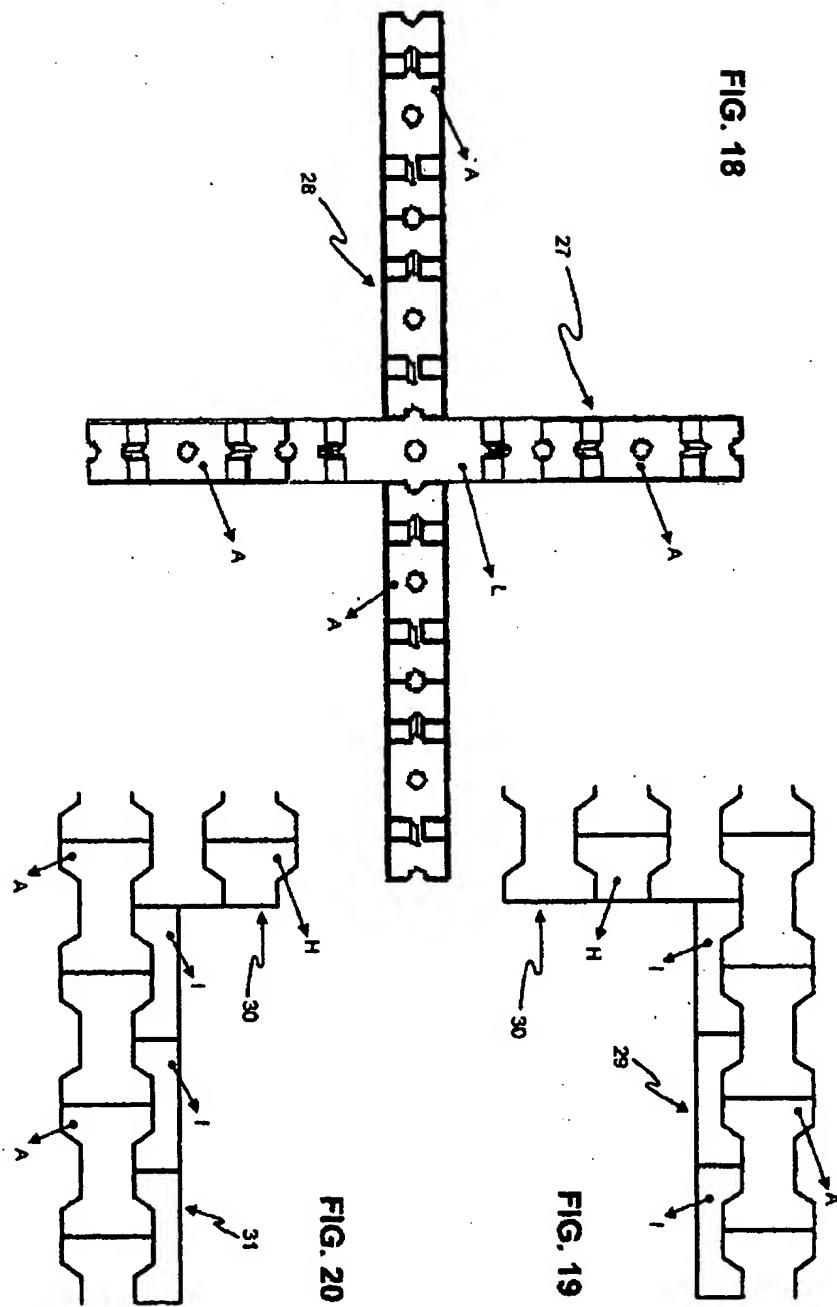
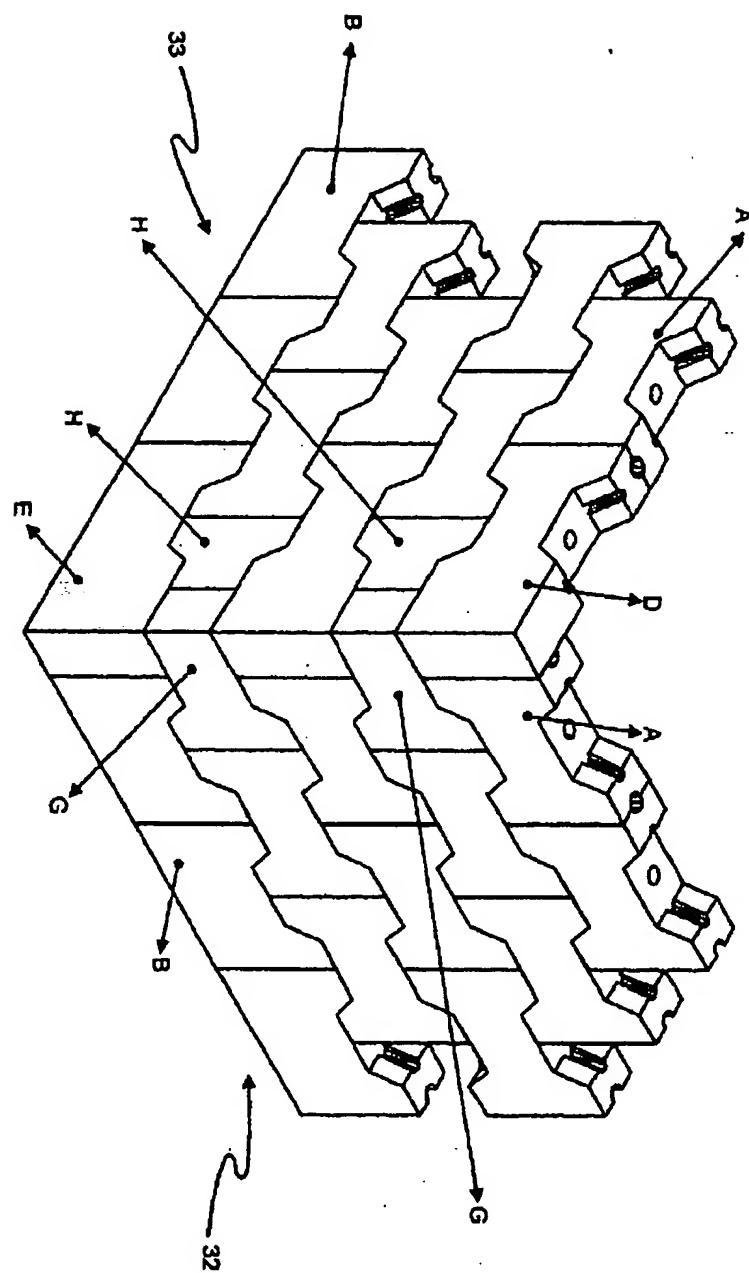


FIG. 20

FIG. 21





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## EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.)		
Y	US 1 367 497 A (PACE) 1 February 1921 (1921-02-01) * the whole document * -----	1-7	E04B2/12		
Y	FR 2 221 036 A (LIMOUSIN) 4 October 1974 (1974-10-04) * page 4, line 6 - page 7, line 13; figures 1-26 * -----	1-7			
			TECHNICAL FIELDS SEARCHED (Int.Cl.)		
			E04B		
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
THE HAGUE	28 November 2001	Mysliwetz, W			
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